



MECAL TECHNICAL NOTE

MTN 8-2

Issued by the *MECAL* Technical Committee

ELECTRICAL SYSTEMS

Application: All Vessels

1.0 Systems covered

12/24V dc system with insulated poles

240V/110V ac insulated systems from generator and/or inverter

2.0 References

Bureau Veritas Rules for Small Vessels

BS EN ISO 10133 - Small Craft - Electrical Systems - Extra Low Voltage d.c. Installations

BS EN ISO 13297 - Small Craft - Electrical Systems - Alternating Current Installations.

IEC 92-507 - Electrical Installation of Pleasure Crafts

Good Marine Wiring Practice

BMEA/BMIF Code of Practice

Department of Transport Merchant Shipping Notice M.1557 – “Electrical Installations in Small Craft – Fire Risks”

3.0 Choice of cables

Cables should be marine grade to BS6883 or equivalent.

Other types of cable can be accepted where they form part of a manufacturer’s supply e.g. instrumentation & power supply leads, transmitting, receiving aerial cable.

4.0 Cable Installation

Cables should be run & secured to avoid damage & chafe.

Transits through watertight bulkheads & decks should be glanded to maintain watertight integrity.

Single core cables without electrical protection e.g. battery & starter cables should be “short circuit proofed” i.e. constructed with sheath over the insulation and run, secured, protected in such a manner as to prevent the possibility of short circuit. (the term “short circuit proofed” is defined in the above referenced D-o-T “M” Notice 1557)

5.0 Wiring connections

All connections should be of the crimped ring or finger type using the correct appropriate crimping tool for the size of conductor. Earth terminations should be clean & protected against corrosion.

All wiring terminations should have identification numbers/letters on wire & on terminal, corresponding to the wiring diagram.

All consumer devices (eg light fittings) are to have both poles insulated.

Anti-vibration measures should be taken where appropriate e.g. lock washers for machinery terminations.

6.0 Battery installation

Batteries shall not be installed above or below a fuel tank or filter (gel batteries can be located above tanks if in suitably sealed tray).

Batteries shall be installed well clear of bilges.

Battery isolation shall be as close to the battery as reasonably practical.

Batteries shall be secured in place sufficient to prevent movement in the event of a complete knock-down.

Terminals are to be protected against corrosion.

Terminals are to be protected against accidental contact with metal objects e.g. tools.

Battery spaces should have adequate ventilation for dispersal of hydrogen to atmosphere, under normal & fault charging conditions (this applies to all types of battery).

7.0 Electromagnetic Interference (EMI) prevention

Basic guidance to avoid EMI is as follows :-

- AC & DC power cables should not be grouped with sensitive cables.
- Radio receiver aerial feeders may be grouped together but separated from all other cables by at least 50mm.
- Radio transmitter aerial feeders may be grouped together but separated from all other cables by at least 100mm. If possible, they should be routed away from sensitive equipment.
- Sensitive instrument cables (eg pulse cables, digital data & databus cables) should be separated from all other cables by at least 50mm.
- Less sensitive instrument cables (analogue & digital input signals) may be run together.
- Crossovers of incompatible cables should be made as close to 90⁰ as possible. Separation should still be maintained at 75% of above distances, if possible.
- Other instructions/guidance from equipment manufacturers should be respected.

8.0 Earthing & Bonding (incl earth leakage protection)

A central earth bonding terminal(s) will be welded or bolted to the hull structure. This will provide the necessary earth bonding connection for the main engine & generator frames, insulated metal fuel day tank, insulated metal fuel pipe work and metal enclosures of any circuits operating above 55V to hull potential (ac or dc).

The terminal(s) should be positioned well clear of the bilge and be accessible for maintenance.

It is most strongly recommended to fit earth leakage protection devices to domestic sockets or appliances where voltages are >55V to earth

For general information refer to BMF Code of Practice for Electrical & Electronic Systems in Boats – current edition and ISO 13297

9.0 Owners Manual

An owners manual shall be provided with information & wiring diagram as detailed in ISO10133 Annex B. This should provide sufficient detail of circuit identification to enable fault tracing.

10.0 Testing

The following tests should be carried out :-

- Wiring continuity checks
- Wiring insulation (megger) tests at minimum 100V for dc systems, 500V for ac systems
- Systems functional tests
- EMC (Electromagnetic Compatibility) tests in the areas containing sensitive electronic equipment (eg using hand held radio transmitter)

Note: These tests should be carried out by a competent marine electrician & report issued. Surveyors should not undertake this work, particularly where sensitive electronic equipment is installed.